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In the U.S. Patent and Trademark Office

Appellants:	Anderson	Group:	2173
Serial No.:	10/729,574	Paper No.:	
Filed:	12/04/2003	Examiner:	Basom, Blaine T.
For:	Human-Computer Interfaces Incorporating Haptics And Path-Based Interaction		

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Submission of Appeal Brief. Appellant submits herewith an Appeal Brief in the subject application. 37 CFR 41.37; MPEP 1205.

Extension. Appellant filed a Notice of Appeal with certificate of mailing dated 11/19/2005. The Office's PAIR system shows the Notice received not before 11/23/2005; the Office's image of the Notice shows a date stamp of 11/28/2005. The time period for submission of the Appeal Brief is from the Office's receipt of the Notice. MPEP 1205.1. This submission is within two months of the Office's receipt of the Notice, accordingly, no extension is required.

Fee. Appellant submits herewith a check for **$250** in payment of the fee for filing this Appeal Brief at the applicable small entity rate.

Respectfully submitted,

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Certificate of Mailing

I hereby certify that this paper (along with any referred to as being attached or enclosed) is being deposited on the date shown below with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop Appeal Brief – Patents; Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

January 23, 2006
date

V. Gerald Grafe
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Appeal Brief

Inventor: Thomas G. Anderson

Serial No.: 10/729,574

Filed: 12/04/2003

Examiner: Basom, Blaine T.

Group: 2173

Title: Human-Computer Interfaces Incorporating Haptics And Path-Based Interaction

Table of Contents

Real Party in Interest

Novint Technologies, Inc. owns the subject application by way of assignment from the sole inventor, Thomas G. Anderson.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

Claims 1-33 were originally filed. In amendments previously entered, Claims 1, 2, and 33 were canceled, and new Claims 34-38 were added.

Claims 3-32 and 34-38 are pending, all of which stand rejected under an Office Action of 5/20/2005, and all of which are appealed.

Status of Amendments

There was no amendment filed subsequent to final rejection. In a paper filed 7/15/2005, Appellant requested withdrawal of the finality of the final rejection, since it included a new ground of rejection on an unamended claim. The Examiner responded by phone 8 months after the rejection, withdrawing the finality of the rejection but setting no new period for response.

Summary of Claimed Subject Matter

Each claim is in bold font when it is first introduced. The dependent claims are set forth under their respective parent independent claims. References are to numbered paragraphs, and corresponding page and line numbers, and figures in the Specification.

Claim 3 is independent, and concerns a computer interface, specifically a method of using forces with a haptic device to allow a user to control the motion of an object in a computer application such as a computer game. *E.g.,* [0021] (p.6 lin.26 – p.7 lin.11); [0024] (p.8 lin.6-24); [0029] (p.10 lin.5-6); Figs. 4, 10. The method establishes an object path and a device path. *E.g.*, [0015] (p.4 lin.21)-[0019] (p.6 lin.13). The object path represents motion of the object in the spec of the computer application, e.g., motion of a character, or a golf club. The device path represents motion of the haptic device, e.g. a path amenable to the types of motion suitable for the haptic device in the real world space occupied by the device. The two paths are in correspondence with each other, such that the user moving the device along the device path in the real world can cause the interface to move the object along the object path in the computer space. The interface applies a force to the haptic device if the user moves the device off the device path. *E.g.*, [0020] (p.6 lin.14-25). The object, while moving along the object path, can interact with other aspects of the application (e.g., a golf club can strike a golf ball, or the dirt); the interface applies forces corresponding to such interactions to the haptic device, allowing the user to feel the interaction of the object with the computer application. *E.g.*, [0021] (p.6 lin.26 – p.7 lin.11). **Claims 7, 8, 10, 11, and 13** depend from Claim 3, and add limitations not argued separately herein.

Claim 4 depends from Claim 3, and adds the limitation that the interface applies forces to the haptic device representative of simulated momentum and inertia of the object. [0021] (p.7 lin.7-10). This is used, for example, when the object is an avatar of a physical object, and it is desired to communicate a sense of momentum and inertia as though the object were real rather than simulated.

Claim 5 depends from Claim 3, and adds the limitation that the <u>object</u> path depends on the state of the application, such as when an object moves differently in different simulated conditions or at different difficulty levels within a computer game. [0018] (p.5 lin.30-32); [0031] (p.10 lin.25-31).

Claim 6 depends from Claim 3, and adds the limitation that the <u>device</u> path depends on the state of the application, such as when the user motion required to control an object is different is different conditions in the application (e.g., a computer character stuck in mud might require larger user device motions than one on pavement). [0018] (p.5 lin.30-32); [0031] (p.10 lin.25-31).

Claim 9 depends from Claim 8, and adds the limitation that the visual representation of the object changes when the user moves the haptic device off the device path, i.e., visually communicates off-path motion to the user, such as when it is desirable that the user see that a computer character is leaving a desired path. [0037] (p.12 lin.24-30).

Claim 19 depends from Claim 3, and adds the limitation that a characteristic of the object is determined from motion of the device off the device path. [0020] (p.6 lin.18-21); [0041] (p.13 lin.24-34).

Claim 20 depends from Claim 19, and adds the limitation that the interface applies force resisting device motion off the device path in one dimension, and determines a characteristic of the object from device motion off the device path in another dimension. [0022] (p.7 lin.12-24); [0020] (p.6 lin.14-25).

Claim 21 depends from Claim 3, and adds the limitation that the magnitude of force resisting device motion off the device path depends on the position of the object along the object path, such as when, for example, it is desired that the path is easier or harder to stay on as the object gets nearer or farther from some goal, or as the object passes through certain conditions in the application (e.g., a skier on wet snow, a car on ice). [0021] (p.6 lin.26 – p.7 lin.11).

Claim 22 depends from Claim 3, and adds the limitation that the magnitude of the force resisting device motion off the device path depends on the interaction of the object with the application, such as when a computer character is being pushed off the path by wind or another object. [0021] (p.6 lin.26 – p.7 lin.11).

Claim 23 depends from Claim 3, and adds the limitation that the magnitude of the force resisting device motion off the device path depends on a user-assistance parameter, such as a difficulty level setting in a game. [0030] – [0031] (p.10 lin.18-31).

Claim 24 depends from Claim 23, and adds the limitation that the user-assistance parameter is established by a measure of the user's proficiency, such as in a game that gets more difficult as the user skill increases. [0030] – [0031] (p.10 lin.18-31).

Claims 26 depends from Claim 3, and adds the limitation that the interface detect when the user supplies a specific signal to trigger initiation of the device path relative to the position of a cursor when the signal was supplied. Claims 27 and 30 depend from Claim 26, and add a limitation not separately argued herein. [0028] (p.9 lin.13-30).

Claims 28 and 29 depend from Claim 26, and add the limitation that the specific signal be from a switch activated by the user. [0028] (p.9 lin.13-30).

Claim 31 depends from Claim 3, and adds the limitation that the computer application is a golf simulation, and that the computer object is a golf club, and that the interface apply force to the haptic device responsive to interaction of the golf club with other objects in the computer application (e.g., a computer golf ball). [0034] – [0037] (p.11 lin.30 – p.12 lin.30).

Claim 32 depends from Claim 3, and adds the limitation that the computer application is a pool simulation, and that the computer object is a pool cue.

Claim 38 depends from Claim 31, and adds the limitation that the object path and the device path have different shapes; i.e., the computer golf club moves along a path of one shape in the computer application, and the user moves the device along a path of a different shape in the physical world. [0015] (p.4 lin.21-29); [0017] (p.5 lin.11-18); [0029] (p.9 lin.31 – p. 10 lin.17).

Claim 14 is independent, with object path and device path elements similar to those of Claim 3. Claim 14 adds the further step of applying forces to the haptic device to encourage it to a specific region in its range of motion. The region is defined such that the user will be able to move the device along the device path without running against limitations of the haptic device's range of motion. As a simplified one-dimensional example, if the device path requires 2 inches motion left of the starting point, and 8 inches motion to the right, then the interface will apply forces to the haptic device until the device is more than 2 inches from the left extreme of its range of motion and more than 7 inches from the right extreme. The starting region, of course, can be more complex for three-dimensional devices with irregular ranges of motion. [0023] (p.7 lin.25 – p.8 lin.5).

Claim 15 depends from Claim 14, and adds the limitation that the device path and the object path have different shapes, e.g., the device path can be a path suited for manual input by the user, while the object path can be a complex visually realistic representation of a physical object's motion. [0015] (p.4 lin.21-29); [0017] (p.5 lin.11-18); [0029] (p.9 lin.31 – p. 10 lin.17).

Claim 16 depends from Claim 15, and adds the limitation that the device path defines a curve in three dimensions. [0022] (p. 7 lin.12-24); Fig. 3.

Claim 17 depends from Claim 16, and adds the limitation that the device path defines a curve in two dimensions. [0022] (p. 7 lin.12-24);Fig. 2.

Claim 18 depends from Claim 15, and adds the limitation that the device path defines a surface in three dimensions. [0022] (p. 7 lin.12-24).

Claim 25 depends from Claim 14, and adds the limitation that the interface detect when the user moves the haptic device into a defined region, and then applying force to the device to move the device onto the device path. [0023] (p.7 lin.25 – p.8 lin.5); Fig. 5.

Claim 34 depends from Claim 15, and adds the limitation that the two paths are not in one to one correspondence with each other. [0029] (p.9 lin.31 – p.10 lin.17).

Claim 35 is independent, and with object path and device path elements similar to those of Claim 3. Claim 35 adds the limitation that the computer application is a computer presentation of the interaction of object simulating physical objects, and that the interface allows a user to control the motion of one of the simulated physical objects. Claim 36 depends from Claim 35 and adds a limitation not separately argued herein. E.g., [0034]-[0037] (p.11 lin.30 – p. 12 lin.30).

Claim 37 depends from Claim 35 and adds the limitation that the interface allow the user to selectively turn the path interaction on and off. [0028] (p.9 lin.12-30); Fig. 7.

Grounds of Rejection to be Reviewed on Appeal

Grounds of rejection are presented in the order set by the Examiner in the Office Action of 5/20/2005.

A. Claims 3-4, 7-8, 11-13, 19-24, and 26-30 were rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent 6,219,032 (*Rosenberg*). The Examiner asserted that *Rosenberg's* teaching of manipulation of a cursor in a two-dimensional windowed interface, with "groove" forces applied when the cursor is in a scroll bar, taught all the elements of the subject claims. The specific assertions and their application to specific claims are presented in detail in the Argument section herein.

B. Claims 3, 5, 6, 35, and 36 were rejected under 35 U.S.C. 102(e) as anticipated by U.S. Patent 6,801,187 (*Stewart*). The Examiner asserted that *Stewart's* teaching of an interface that allows a user to browse or edit the surface of a three-dimensional model taught all the elements of the subject claims. The specific assertions and their application to specific claims are presented in detail in the Argument section herein.

C. Claim 9 was rejected under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with U.S. Patent 5,655,093 (*Frid-Nielson*). The Examiner combined *Rosenberg's* scrollbar grooves with *Frid-Nielson's* teaching of a changeable cursor icon, and asserted that the combination rendered Claim 9 obvious. The specific assertions and their application to the elements of Claim 9 are presented in detail in the Arguments section herein.

D. Claim 10 was rejected under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with U.S. Patent 6,191,785 (*Bertram*). The Examiner combined *Rosenberg's* scrollbar grooves with *Bertram's* slider bars for manipulation of data display, and asserted that the combination rendered Claim 10 obvious. The specific assertions and their application to the elements of Claim 10 are presented in detail in the Arguments section herein.

E. Claims 14 and 25 were rejected under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with U.S. Patent 6,288,705 (*Rosenberg II*). The Examiner combined *Rosenberg's* scrollbar grooves with *Rosenberg II's* pre-placement of a mouse in the center of a screen for use with ballistic mouse motion, and asserted that the combination rendered Claims 14 and 25 obvious. The specific assertions and their application to the elements of Claims 14 and 25 are presented in detail in the Arguments section herein.

F. Claim 15 was rejected under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with U.S. Patent 6,583,782 (*Gould*). The Examiner combined *Rosenberg's* scrollbar grooves with cursor and device manipulations taught in *Gould* as alternative to force feedback, and asserted

that the combination rendered Claim 15 obvious. The specific assertions and their application to the elements of Claim 15 are presented in detail in the Arguments section herein.

G. Claims 16-18 were rejected under 35 U.S.C. 103(a) as obvious in view of *Rosenberg*, *Gould*, and U.S. Patent 6,552,722 (*Shih*). The Examiner combined *Rosenberg's* scrollbar grooves, *Gould's* alternatives to force feedback, and *Shih's* haptic sculpting system, and asserted that the combination rendered Claims 16-18 obvious. The specific assertions and their application to the elements of Claims 16-18 are presented in detail in the Arguments section herein.

H. Claim 34 was rejected under 35 U.S.C. 103(a) as obvious in view of *Rosenberg*, *Gould*, and *Rosenberg II*. The Examiner combined *Rosenberg's* scrollbar grooves, *Gould's* alternatives to force feedback, and *Rosenberg II's* pre-placement of a mouse in the center of a screen for use with ballistic mouse motion, and asserted that the combination rendered Claim 34 obvious. The specific assertions and their application to the elements of Claim 34 are presented in detail in the Arguments section herein.

I. Claim 32 was rejected under 35 U.S.C. 103(a) as obvious in view of U.S. Patent 6,220,963 (*Meredith*) and *Rosenberg*. The Examiner combined *Meredith's* computerized pool cue hardware with *Rosenberg's* scrollbar grooves, and asserted that the combination rendered Claim 32 obvious. The specific assertions and their application to the elements of Claim 32 are presented in detail in the Arguments section herein.

J. Claims 31 and 38 were rejected under 35 U.S.C. 103(a) as obvious in view of U.S. Patent 6,277,030 (*Baynton*), *Rosenberg*, and *Meredith*. The Examiner combined *Baynton's* golf swing hardware trainer, *Rosenberg's* scrollbar grooves, and *Meredith's* computerized pool cue hardware, and asserted that the combination rendered Claims 31 and 28 obvious. The specific assertions and their application to the elements of Claims 31 and 38 are presented in detail in the Arguments section herein.

K. Claim 37 was rejected under 35 U.S.C. 103(a) as obvious in view of *Stewart* and *Rosenberg II*. The Examiner combined *Stewart's* three-dimensional model editing system with *Rosenberg II's* ballistic mouse accommodation, and asserted that the combination rendered Claim 37 obvious. The specific assertions and their application to the elements of Claim 37 are presented in detail in the Arguments section herein.

Argument

Rejections under 35 U.S.C. 102

In all arguments relating to rejections under 35 U.S.C. 102, Appellant relies on the settled principle that to anticipate a claim, the reference must teach every element of the claim, in as complete detail as contained in the claim. *See, e.g.*, MPEP 2131, *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

A. Rejections of Claims 3-4, 7-8, 11-13, 19-24, and 26-30 under 35 U.S.C. 102(b) as anticipated by *Rosenberg*

A. Claims 3, 7, 8, 10, 11, and 13 argued together, but separately from other claims under this ground of rejection

Claim 3, and Claims 7, 8, 10, 11, and 13 depending therefrom, all recite an interface having an object that moves within a defined object path (Claim 3 element d), applies force to an input device responsive to motion of the device off a defined device path (Claim 3 element e), and applies force to the device responsive to interaction of the same object with the computer application (Claim 3 element f). *Rosenberg* does not teach an interface with these elements.

In support of the rejection, the Examiner cited *Rosenberg's* teaching of a groove for guiding movement of a cursor (citing *Rosenberg* column 38 line 38 – column 9 line 39), and *Rosenberg's* separate teaching of provision of force feedback when a cursor crosses window boundaries (citing *Rosenberg* column 44 line 65 – column 45 line 21). *Rosenberg* teaches various ways to use force feedback to assist a user interacting with a GUI. *Rosenberg* teaches the use of a groove formed by specific force profiles to allow a user to keep a cursor **within** a scroll bar. *Rosenberg* column 38 line 38 – column 9 line 39. *Rosenberg* also teaches providing bumps or other force impulses to communicate to the user when a cursor moving across a screen **crosses window boundaries** within the GUI. *Rosenberg* column 44 line 65 – column 45 line 21. *Rosenberg's* grooves **keep** a cursor within a region of the GUI. *Rosenberg's* bumps, on the other hand, communicate when the cursor **crosses** boundaries when moving not within a scroll bar. According to *Rosenberg's* teaching, a user can be **moving within** a region of the GUI corresponding to a groove (e.g., within a scroll bar portion of the GUI), or can be **moving across** regions of the GUI (e.g., moving a cursor across multiple regions of the display). *Rosenberg* has no teaching, however, of (1) applying forces to an input device based on interactions of an object with the application combined with (2) applying forces to the input device while the cursor is in a groove. This is as would be expected

since *Rosenberg* teaches grooves and bumps as applicable in different scenarios: grooves while **in** a region, and bumps while **traversing** regions.

In contrast, Claim 3 recites the limitation that forces responsive to interaction with the application be applied to the device (and hence communicated to the user of the device) **while** the user is moving an input device along a device fundamental path. This combination would have no meaning in *Rosenberg's* teaching, since *Rosenberg's* grooves are applicable **within** a region, and *Rosenberg's* bumps are applicable when **crossing** regions. In Appellant's teaching, and as expressed in Claim 3, the combination is useful in such examples as computer games, where the user must move an object along a specific path but the object can also interact with the game while it is moving along the path.

Further, *Rosenberg's* teaching applies to motion of a **cursor** within a GUI. In contrast, Appellant's claim 3 is limited to the control of an **object** in an application. A cursor, as used in *Rosenberg* and as generally known to those skilled in the art, is a representation on a display of a point at which the user can initiate some action. User manipulation of an input device can move a cursor on the screen, and the user can initiate some action (e.g., insert text, or select a file) based in part on the relationship of the cursor to the rest of the display. In contrast, Appellant's claim is limited to control of an object in the application. As shown in Appellant's examples, an object is not just the location of a point of interest on the screen; rather, an object corresponds to an entity on the screen and represented in the application (e.g., a golf club or a pool cue). *Rosenberg* teaches control of cursors, not objects, in an application.

Since *Rosenberg* does not teach all the limitations of Claim 3, specifically limitations that forces responsive to interaction with the application be applied in combination with forces applied responsive to off-path motion of the device, and limitations to control and interaction of a computer object within an application, *Rosenberg* does not anticipate Claim 3.

<u>A. Claim 4 argued separately</u>

Claim 4 depends from Claim 3, and accordingly *Rosenberg* does not anticipate Claim 4 for the same reasons that *Rosenberg* does not anticipate Claim 3. Further, Claim 4 recites the additional limitation that forces applied to the haptic input device correspond to momentum and inertia of an object in the application. The Examiner cited *Rosenberg* col. 59 line 49 – col. 60 line 62 as teaching this limitation. However, the cited teaching of *Rosenberg* is not taught as applicable with an object moving in one of *Rosenberg's* grooves (assuming, as required for the rest of this rejection, that *Rosenberg's* cursor is an object). Rather, *Rosenberg* teaches that objects in the application can have simulated masses, and forces can be applied when such objects are dragged across window boundaries, but has no teaching or suggestion that objects with simulated mass or

inertia move in *Rosenberg's* groove-constrained slider bars. Accordingly, *Rosenberg* does not teach forces corresponding to momentum or inertia of an object that is moving within a defined object path, and does not anticipate Claim 4.

A. Claims 19 and 20, argued together but separately from other claims under this ground of rejection

Claims 19 and 20 depend from Claim 3, and accordingly *Rosenberg* does not anticipate Claim 19 for the same reasons that *Rosenberg* does not anticipate Claim 3. Further, Claim 19 recites the additional limitation that the interface change a characteristic of the object responsive to motion of the haptic input device off the device path. *Rosenberg* does not teach an interface with such an element. The Examiner asserted that *Rosenberg* taught such an interface at col. 45 line 61 – col. 46 line 19. The cited passage from *Rosenberg*, however, teaches that a user can position a cursor within a path, and click a physical button to initiate a command to the computer. *Rosenberg* also teaches that, if the device has a degree of freedom not used in the defining the path, the user can move the device in that degree of freedom to initiate such a command. Commanding a computer to take some new action is not changing a characteristic of an object; *Rosenberg* consequently has no teaching of changing a characteristic of an object based on motion off the device path.

Further, *Rosenberg* has no teaching of changing a characteristic of the object, notwithstanding the Examiner's assertion that providing a command gesture to a computer program is "considered a characteristic of the cursor." Office Action page 4. While the Examiner may, with the benefit of Appellant's teaching, **consider** a command gesture to be a characteristic of an object, this interpretation of "characteristic" is overly broad, and contrary to the accepted meaning of the word. A characteristic is "a feature that helps to identify, tell apart, or describe recognizably; a distinguishing mark or trait" (dictionary.com); or "a distinguishing trait, quality, or property" (Merriam-Webster's Medical Dictionary); or "a distinguishing quality" (WordNet 2.0, Princeton University). A command to a computer is not a feature of the cursor, and does not serve as a distinguishing trait, quality, or property. A command to a computer, as taught by *Rosenberg* and known in the art, directs the computer to perform some action; it is not a characteristic of the cursor. Accordingly, *Rosenberg* does not teach all the limitations of Claims 19 and 20, and *Rosenberg* does not anticipate Claims 19 and 20.

A. Claim 21, argued separately

Claim 21 depends from Claim 3, and accordingly *Rosenberg* does not anticipate Claim 21 for the same reasons that *Rosenberg* does not anticipate Claim 3. Further, Claim 21 recites the additional limitation that the force applied to the input device responsive to motion off the device path is dependent on the position of the object along the object path.

Rosenberg teaches groove forces resisting cursor motion outside of a slider bar, but has no teaching of such forces varying based on where the cursor is positioned along the slider bar. The Examiner asserted that *Rosenberg* had such teaching at col. 60 lines 2-23, but the cited portion of *Rosenberg* (and every other such teaching in *Rosenberg*) concerns forces applied to motion **outside** the object path (i.e., forces applied to keep the device in the path). There is no mention of any variation of such forces as the object moves **along** the path. The Examiner's rejection requires that *Rosenberg's* groove forces equate to the forces expressed in Claim 3 element e; applying the rejection to the additional limitation of Claim 21 would require that *Rosenberg's* groove forces vary in magnitude as the cursor moves along the slider bar. *Rosenberg* has no such teaching, however, and consequently does not anticipate Claim 21.

A. Claim 22, argued separately

Claim 22 depends from Claim 3, and accordingly *Rosenberg* does not anticipate Claim 22 for the same reasons that *Rosenberg* does not anticipate Claim 3. Further, Claim 22 recites the additional limitation that the magnitude of the force applied to the input device responsive to motion off the device path is dependent on the interaction of the object with the computer application.

Rosenberg teaches groove forces resisting cursor motion outside of a slider bar, but has no teaching of such forces varying based on interaction of a cursor with the application. The Examiner asserted that *Rosenberg* had such teaching at col. 60 lines 24-62, where *Rosenberg* teaches that forces can be applied to an input device corresponding to collisions of an object being dragged across window boundaries on a screen. This teaching of *Rosenberg*, however, does not teach such forces applied to the cursor while the cursor is in one of *Rosenberg's* grooves, and does not teach any modification of *Rosenberg's* groove forces based on interaction of the cursor with the application. Even if the Examiner is correct that *Rosenberg* teaches forces applied to a device based on interaction of an object with the application, such forces in *Rosenberg* are representative of the corresponding interactions and are not modification of *Rosenberg's* groove forces. In contrast, the limitation in Claim 22 is that the force applied responsive to off-path motion be based on interaction with the application. For the Examiner's rejection, *Rosenberg* would have to teach that the magnitude of the groove forces change based on interaction of the cursor with the application; *Rosenberg* has no such teaching, however, and consequently does not anticipate Claim 22.

A. Claim 23, argued separately

Claim 23 depends from Claim 3, and accordingly *Rosenberg* does not anticipate Claim 23 for the same reasons that *Rosenberg* does not anticipate Claim 3. Further, Claim 23 recites the additional

limitation that the magnitude of force applied to off-path motion of the haptic device be dependent on a user-assistance parameter of the interface.

The Examiner picked two separate portions of *Rosenberg* to attempt to find such teaching. In the first, *Rosenberg* col. 38 lines 38-53, *Rosenberg* teaches groove forces to keep a cursor along a linear path, and teaches that the groove force magnitude can be specified by a stiffness parameter. That portion of *Rosenberg* has no mention of any variation in the stiffness parameter, or of any user-assistance parameter allowing tailoring of the groove forces. In the second portion, 14 columns later, *Rosenberg* col. 52 lines 54-59, *Rosenberg* is teaching about a programmer of a graphical user interface specifying attractive forces that can be used to attract a cursor to a specific target location on the GUI, and teaches that a user of such a GUI might be able to designate force magnitudes to associate with particular targets. The first portion has no mention of forces with variable magnitudes; the second portion has nothing to do with groove forces; and neither has any mention of user-assistance parameters. The rejection, therefore, relies on two unrelated teachings in *Rosenberg*, with the only teaching that the concepts might be used together found in the elements of Appellant's Claim 23, with the missing link supplied by the Examiner "considering" *Rosenberg's* targeting of graphical interface objects to be a user-assistance parameter, a consideration with no basis in language or the teaching of *Rosenberg*. Accordingly, *Rosenberg* has no teaching of groove forces dependent on a user-assistance parameter of the interface, and *Rosenberg* does not anticipate Claims 23.

<u>A. Claim 24, argued separately</u>

Claim 24 depends from Claim 23, and accordingly *Rosenberg* does not anticipate Claim 24 for the same reasons that *Rosenberg* does not anticipate Claim 23. Further, Claim 24 recites the additional limitation that the user-assistance parameter be determined from measure of the user's proficiency in manipulating the input device. In addition to the deficiencies in *Rosenberg's* teaching relative to Claim 23, *Rosenberg* has no mention of any measure of user proficiency, or of any adjustment in groove forces based on such a measure. Consequently, *Rosenberg* does not anticipate Claim 24.

<u>A. Claims 26, 27 and 30, argued together but separate from other claims under this ground of rejection</u>

Claims 26, 27, and 30 depend from Claim 3, and accordingly *Rosenberg* does not anticipate Claims 26, 27, and 30 for the same reasons that *Rosenberg* does not anticipate Claim 3. Further, Claims 26, 27, and 30 recite the additional limitation that the device path be established responsive to an initiation signal provided by the user, and that the device path be established relative to the position of a user-controlled cursor when the initiation signal was supplied.

The Examiner asserted that *Rosenberg* taught such elements at col. 3 lines 37-49 and col. 59 line 60 – col. 60 line 13. *Rosenberg* teaches the use of attractive forces to help a user position a cursor on a particular on-screen target. The target has a defined location on the screen, and the path, if any, associated with the target also has a defined location. The path is also a static part of the interface: any time the user moves the cursor to the target, the attractive forces pull the cursor in. The Examiner's expansion of *Rosenberg's* teaching to find the limitations of Claims 26, 27, and 30 requires the user to move a cursor to the path (to supply the initiation signal, Office Action page 10), but then the path must necessarily be established **before** the signal is supplied. In contrast, Claims 26, 27, and 30 recite the limitation that the path not be established until **after** the user supplies an initiation signal, then the path is established based in part on the position of the cursor when the signal was supplied. A user can thus bring a path into existence wherever the cursor happens to be on the screen, and the path will be established recognizing the current position of the cursor. Since *Rosenberg* has no teaching of an interface with this element, *Rosenberg* does not anticipate Claims 26, 27, and 30.

A. Claims 28 and 29, argued together but separately from other claims under this ground of rejection

Claims 28 and 29 depend from Claim 26, and accordingly *Rosenberg* does not anticipate Claims 28 and 29 for the same reasons that *Rosenberg* does not anticipate Claim 26. Claims 28 and 29 recite the additional limitation that that the device path be established based on user activation of a switch.

The Examiner asserted that Rosenberg taught this limitation "by determining when the user positions a cursor within a region associated with a groove." Office Action p. 10. The Examiner stated that the positioning of a cursor within the groove "is understood to comprise a switch." Office Action p. 10. The Examiner further hypothesized that the input device might have a switch to detect its movement and position, or software implementing *Rosenberg's* method might comprise "some sort of switch." The rejection is thus founded on the Examiner's personal conjectures of what might be changed in *Rosenberg's* teaching to produce the invention of Claims 28 and 29; rather than teaching in *Rosenberg* of every element in the claims as is required for anticipation. Further, the Examiner's conjectures are in error: a switch, as understood in the art and from Appellant's Specification, is "a device used to break or open an electric circuit or to divert current from one conductor to another" (dictionary.com), or "a control consisting of a mechanical or electrical or electronic device for making or breaking or changing the connections in a circuit" (WordNet 2.0, Princeton University). Appellant's Specification also allows a defined motion of the input device, such as a tight circular motion, to indicate a transition to path-based interaction. No definition of

"switch" includes "positioning of a cursor within a groove," as suggested by the Examiner. Also, if "positioning of a cursor within a groove" constitutes a switch, as required by the rejection, then the path must necessarily exist **before** the switch is actuated, which contradicts the limitation of the claim that the path be established **after** the switch is actuated.

Further, the Examiner's suggestion that the device itself include a switch would eliminate another element of the claim: the limitation that the device path be established in part based on the position of a cursor (Claim 26 element b). The Examiner's addition of a switch in the device would at best result in a device path established whenever the device was moved to a certain position, independent of any on-screen cursor position.

Claims 28 and 29 recite the limitation that the interface establish a device path according to the position of a cursor, and after the user activates a switch. The Examiner's attempt to supply the teaching missing from *Rosenberg* still does not produce the invention of Claims 28 and 29. Accordingly, *Rosenberg* does not anticipate Claims 28 and 29.

B. Rejection of Claims 3, 5, 6, 35, and 36 under 35 U.S.C. 102(e) as anticipated by *Stewart*

B. Claim 3; argued separately

Claim 3 recites an interface having an object that moves within a defined object path (Claim 3 element d), applies force to an input device responsive to motion of the device off a defined device path (Claim 3 element e), and applies force to the device responsive to interaction of the same object with the computer application (Claim 3 element f). *Stewart* does not teach an interface with these elements.

Stewart teaches a system for allowing a user to browse a virtual surface. *Stewart* teaches application of forces to constrain the user to motion along the surface when the user is browsing the virtual surface. The rejection relies on the following correspondences between *Stewart's* teaching and elements in Claim 3:

Stewart	Claim 3
virtual surface	object path
user interface icon	object
path the user must move the device along when the object is constrained to the virtual surface	device path

Note that this correspondence of elements has no teaching from *Stewart* that the forces be applied to the device responsive to interaction of the object with the application (Claim 3 element f). To find such teaching, the rejection brings in *Stewart's* teaching of a alternative mode of operation:

allowing the user to modify the virtual surface. *Stewart* teaches that in this mode, the user can move the user interface icon into the virtual surface and thereby change the virtual surface. *Stewart* teaches that the two modes of interaction are distinct and **mutually exclusive**. *See, e.g.* *Stewart* col. 7 lines 13-24, also cited in the Office Action. The mutual exclusivity of the two modes is apparent since the browsing mode requires that the user motion be **limited to** the existing surface, while in the modification mode the surface is **derived from** the user motion. Even if the two modes were not mutually exclusive, the rejection requires that the object path (the virtual surface) also serve as the interaction with the application (since that is the only source in *Stewart* of any other forces applied to the device). In contrast, Claim 3 is limited to an interface that allows distinct object path and object interaction, allowing the user to experience forces from interactions while the object is moving along the object path. Since *Stewart* does not teach these limitations, *Stewart* does not anticipate Claim 3.

B. Claim 5 argued separately

Claim 5 depends from Claim 3, and accordingly *Stewart* does not anticipate Claim 5 for the same reasons that *Stewart* does not anticipate Claim 3. Further, Claim 5 adds the additional limitation that the shape of the object path is dependent on the state of the computer application.

The rejection relies on the assertion that each edit to the virtual surface in *Stewart* corresponds to a different application state, and, since the virtual surface is asserted to correspond to the claimed object path, the object path must depend on the state of the application. However, *Stewart* teaches only two application states: surface browsing state, and surface editing state. If, as the rejection requires, "editing of the surface" equates to "differing application states," then *Stewart* does not teach elements d and e of parent Claim 3, since there is no object path or forces contrary to motion off the object path in the editing mode, where user motion of the cursor **defines** the shape of the path. *Stewart's* teaching can be considered to have an object path, or an object that interacts with the application, but not both. Similarly, *Stewart's* teaching can be considered to have an object path, or infinite different states, but not both. Any construction of *Stewart* that teaches some elements of Claim 5 thus necessarily excludes other elements of Claim 5, and *Stewart* accordingly can not anticipate Claim 5.

B. Claim 6, argued separately

Claim 6 depends from Claim 3, and accordingly *Stewart* does not anticipate Claim 6 for the same reasons that *Stewart* does not anticipate Claim 3. Further, Claim 6 adds the additional limitation that the shape of the device path is dependent on the state of the computer application.

The rejection based on *Stewart* requires that the object path be the virtual surface, and that the device path be generating by constraining the user's motion of the device to a surface corresponding to the virtual surface. Similarly to Claim 5, *Stewart* can not teach both a device path (only possible assuming a **fixed** virtual surface in *Stewart*), and multiple states (only possible assuming a **changeable** virtual surface defined by the motion of the device). Any construction of *Stewart* that teaches some elements of Claim 6 thus necessarily excludes other elements of Claim 6, and *Stewart* accordingly can not anticipate Claim 6,

B. Claims 35 and 36, argued together but separately from other claims under this ground of rejection

Claims 35 and 36 have similar object path and device path elements and relationships as Claim 3, and accordingly *Stewart* does not anticipate Claims 35 and 36 for similar reasons. More specifically, Claims 35 and 36 recite limitations that the object move along an object path, and that forces be applied to the user device corresponding to interactions of the object with other objects in the application. As discussed for Claim 3, the rejection relies on teaching from two mutually exclusive operating modes in *Stewart*. The two modes can not be combined as required by the rejection.

Further, Claims 35 and 36 recite the additional limitation that the interface apply to the presentation of the interaction of objects that simulate physical objects, with a defined object moving along the object path, and that defined object interacting with other simulated physical objects. *Stewart* has no teaching of interaction between simulated physical objects. At most, *Stewart* teaches a single **motionless** simulated physical object (if the *Stewart's* virtual surface is thought of as representing a simulated physical object). *Stewart* has no teaching of any second simulated physical object, and no teaching of a simulated physical object moving along a defined object path. Since *Stewart* does not teach all the elements of Claims 35 and 36, *Stewart* does not anticipate Claims 35 and 36.

Rejections under 35 U.S.C. 103

In all arguments relative to rejections under 35 U.S.C. 103, Appellant relies on the legal concept of *prima facie* obviousness that allocates who has the burden of going forward with production of evidence in each step of the examination process. *See* MPEP 2142; *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *In re Linter*, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972); *In re Saunders*, 444 F.2d 599, 170 USPQ 213 (CCPA 1971); *In re Tiffin*, 443 F.2d 394, 170 USPQ 88 (CCPA 1971), amended, 448 F.2d 791, 171 USPQ 294 (CCPA 1971); *In re Warner*, 379 F.2d 1011, 154 USPQ 173 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968). The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness.

Several of the arguments rely on the settled principle that knowledge of applicant's disclosure must be put aside in reaching a determination of whether the invention as a whole would have been obvious, and that impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art. *See, e.g.*, MPEP 2142, 35 U.S.C. 103.

The arguments also rely on the three basic criteria for a *prima facie* case of obviousness: (1) some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; (2) a reasonable expectation of success; and (3) the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck,* 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

C. Rejection of Claim 9 under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with *Frid-Nielson*

Claim 9 depends from Claim 8, which depends from Claim 3. As discussed relative to Claim 3, *Rosenberg* does not teach or suggest all the elements of Claim 3. *Frid-Nielson* does not supply the missing teaching. More specifically, *Rosenberg* does not teach forces from interactions of an object that is moveable in one of *Rosenberg's* grooves. *Frid-Nielson* teaches the display of different cursor icons to communicate to the user signals or inputs that are currently valid. *See, e.g., Frid-Nielson* col. 3 lines 53-67. *Frid-Nielson* has no mention of force feedback based on object interactions (or force feedback of any kind). Accordingly, neither *Rosenberg* nor *Frid-Nielson* teach or suggest all the limitations of Claim 9 (inherited by dependence on Claim 3). Further, neither *Rosenberg* nor *Frid-Nielson* teach or suggest changing the visual representation of an object based on the object's on-path or off-path condition, an additional limitation of Claim 9. Accordingly, the art does not teach all the elements of Claim 9, and there is no *prima facie* case of obviousness.

Further, even if all of the elements of Claim 9 were taught in the applied art, the proposed combination is not proper since there is no suggestion to make the combination. For a *prima facie* case of obviousness, there must be a teaching or suggestion either explicitly or implicitly in the references themselves to combine the references. *See* MPEP 2143.01. The fact that references **can** be combined is not sufficient. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). The fact that the claimed invention would be within the skill of one of ordinary skill in not enough. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). *See also In re Kotzab,* 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000). The Examiner asserted that *Frid-Nielson* suggested the Examiner's combination at column 8 lines 29-48, where *Frid-Nielson* extols

the advantages of its cursor display methods. *Frid-Nielson*, however, does not suggest any combination of its visual cursor display with force feedback, in the cited section or anywhere else. *Rosenberg* likewise has no suggestion of combining its force feedback concepts with different visual cursor representation techniques. The only suggestion for changing the visual display of an object based on on-path or off-path status is in Appellant's application, and the only suggestion to combine such a visual display with force feedback associated with path-based motion is in Appellant's application. Accordingly, the proposed combination, even if it taught all the limitations of Claim 9, relies on impermissible hindsight and does not establish a *prima facie* case of obviousness of Claim 9.

D. Rejection of Claim 10 under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with *Bertram*

Claim 10 depends from Claim 3. As discussed relative to Claim 3, *Rosenberg* does not teach or suggest all the elements of Claim 3. *Bertram* does not supply the missing teaching. More specifically, *Rosenberg* does not teach forces from interactions of an object that is moveable in one of *Rosenberg's* grooves. *Bertram* teaches the use of multiple slider bars to allow a user to manipulate data values displayed. *See, e.g., Bertram* Abstract. *Bertram* has no mention of force feedback based on object interactions (or force feedback of any kind). Accordingly, neither *Rosenberg* nor *Frid-Nielson* teach or suggest all the limitations of Claim 10 (inherited by dependence on Claim 3). Accordingly, the art does not teach all the elements of Claim 10, and there is no *prima facie* case of obviousness.

Further, neither *Rosenberg* nor *Bertram* teach or suggest two device paths and two object paths, and two objects, additional limitations of Claim 10. The Examiner attempted to produce the invention of Claim 10 by starting with on *Bertram's* background discussion of scrollbars in common computer applications, and then combining *Bertram's* teaching of multiple scrollbars with *Rosenberg's* grooves. Even that combination, however, does not teach the use of two object paths, each with its own corresponding object. Even if *Rosenberg* taught or suggested the path-based interface claimed in Claim 3, combining *Rosenberg's* grooved cursor guidance with *Bertram's* multiple scrollbars would only yield an interface with two scrollbars, with the user allowed to move a **single** cursor into one or the other. In contrast, Claim 10 recites the limitation that the interface move a **first** object in correspondence with the **first** object path, and a **second** object in correspondence with the **second** object path. The art has no teaching or suggestion of two objects, each with its own associated object path. Accordingly, the art does not teach or suggest all the limitations of Claim 10, and there is no *prima facie* case of obviousness.

E. Rejection of Claims 14 and 25 under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with *Rosenberg II*

Independent Claim 14, and Claim 25 depending therefrom, recites a similar path-based interface as Claim 3. As discussed relative to Claim 3, *Rosenberg* does not teach forces from interactions of an object that is moveable in one of *Rosenberg's* grooves. *Rosenberg II* teaches centering of a mouse to facilitate ballistic mouse motion; *Rosenberg II* does not supply the teaching missing from *Rosenberg*. Accordingly, the art does not teach or suggest all the limitations of Claims 14 and 25, and there is no *prima facie* case of obviousness.

Further, Claim 14 recites the additional limitation that the interface apply force to the haptic device to move the device to a starting region, where a starting region is defined to be region such that motion of the device along the device path will not require motion of the haptic device beyond its range of motion. The Examiner relied on teachings by *Rosenberg II* to provide this element. *Rosenberg II* does recognize that a haptic input device can have a limited range of motion. *Rosenberg II*, however, only teaches automatic movement of a haptic mouse to eliminate offsets between a display frame (what the user sees) and a local frame (the frame of the haptic mouse), which offsets arise from velocity-based motion of the mouse (the mouse moves farther on the display for a given physical motion if the physical motion is faster). *Rosenberg II* recognizes that automatic motion of the mouse can be disconcerting to the user, especially when the automatic motion does not correlate with motion of the visual cursor, and recommends that it be done when the user is not grasping the mouse. *Rosenberg II* col. 37 lines 44-61, cited in the Office Action. In contrast, the interface of Claim 14 is not disconcerting to the user: there is no need to decouple visual and haptic representations, since there is no underlying "frame" offset as in *Rosenberg II*, and the interface applies forces to urge to device to a specific region, instead of moving the mouse to the center while not changing the visual display as in *Rosenberg II*.

Further, *Rosenberg II* does not teach the limitation of a starting region as in Claim 14. In *Rosenberg II*, the mouse is centered, to accommodate subsequent motion in any direction. If the motion causes additional frame offsets, then *Rosenberg II* will re-center the mouse. There is no suggestion in *Rosenberg II* of any determination of a starting region based on an object path. In contrast, the interface of Claim 14 determines a starting region based on the object path; the starting region does not need to be in the center as required by *Rosenberg II*: it can be near extremes of the device range of motion if indicated by the object path. Since *Rosenberg II* has no path-based motion, it is not possible in *Rosenberg II* to determine a starting region as in Claims 14 and 25.

Combining *Rosenberg II* with *Rosenberg* might make *Rosenberg's* windowed interface amenable to ballistic mouse control, but there would still be no determination of starting regions based on the object path. The only teaching of such a starting region is in Appellant's Specification, and accordingly the art does not teach or suggest all the limitations of Claims 14 and 25, and there is no *prima facie* case of obviousness.

F. Rejection of Claim 15 under 35 U.S.C. 103(a) as obvious in view of *Rosenberg* in combination with *Gould*

Claim 15 depends from Claim 3. As discussed relative to Claim 3, *Rosenberg* does not teach forces from interactions of an object that is moveable in one of *Rosenberg's* grooves. *Gould* teaches a "virtual force feedback" display, or a display to be used as an **alternative** to force feedback; *Gould* does not supply the interaction force teaching missing from *Rosenberg*. Accordingly, the art does not teach or suggest all the limitations of Claim 15, and there is no *prima facie* case of obviousness.

Further, there is no suggestion to combine *Rosenberg* and *Gould*. *Gould* teaches that its interface is used as an alternative to force feedback. *See, e.g.*, *Gould* col. 6 lines 50-62. The Examiner asserted that "Like *Rosenberg*, ... *Gould* teaches providing "virtual force feedback"." Office Action page 18. This assertion is contrary to the teaching of the references – *Rosenberg* teaches force feedback, while *Gould* teaches an **alternative** to force feedback. The rejection asserts that it would have been obvious to modify the force feedback interface of Rosenberg to include the alternative to force feedback taught by *Gould*. The proposed combination is improper under various principles: it renders *Gould* unsatisfactory for its intended purpose as an alternative to force feedback (*In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)); it changes the principles of operation of the references (force feedback, or an alternative to force feedback) (*In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)); *Gould* teaches away from the combination. The only teaching of a force feedback interface as in Claim 3, combined with differently shaped object and device fundamental paths, is in Appellant's Specification. Accordingly, there is no suggestion to combine the references and there is no *prima facie* case of obviousness.

G. Rejection of Claims 16-18 under 35 U.S.C. 103(a) as obvious in view of *Rosenberg, Gould,* and *Shih*

Claims 16-18 depend from Claim 15. As discussed in regards to Claim 15, the combination of *Rosenberg* and *Gould* does not teach all the limitations of Claim 15, and is not a proper combination. *Shih* concerns a virtual sculpting computer application, and does not provide the missing teachings or the missing suggestion to combine *Rosenberg* and *Gould*. Accordingly, there

is no *prima facie* case of obviousness of Claims 16-18 for similar reasons to those discussed for Claim 15.

The Examiner added *Shih* to the combination to provide teaching of an object path comprising a curve in three dimensions. *Shih* is a virtual sculpting application, and does allow a sculptor to move a tool in three dimensions. However, for a sculpting application to function the device path **must** have the same shape as the object path (sculpting is by nature the removal of material along the path of a tool; having the object follow a differently-shaped path than the tool would not produce a sculpting application). In contrast, Claims 16-18 recite the limitation (from parent Claim 15) that the object and device paths are differently shaped. The combination with *Shih* can not produce the inventions of Claims 16-18 without destroying the utility of *Shih* for its intended purpose. Accordingly, the combination of *Shih* with *Rosenberg* and *Gould* is improper, and there is no *prima facie* case of obviousness.

H. Rejection of Claim 34 under 35 U.S.C. 103(a) as obvious in view of *Rosenberg, Gould,* and *Rosenberg II*

Claim 34 depends from Claim 15. As discussed in regards to Claim 15, the combination of *Rosenberg* and *Gould* does not teach all the limitations of Claim 15, and is not a proper combination. *Rosenberg II* concerns accommodation of ballistic mouse motion with a motion-limited haptic mouse, and does not provide the missing teachings or the missing suggestion to combine *Rosenberg* and *Gould*. Accordingly, there is no *prima facie* case of obviousness of Claim 34 for similar reasons to those discussed for Claim 15.

Further, Claim 34 recites the additional limitation that the device and object paths not be in one-to-one correspondence (in addition to being differently shaped, a limitation from parent Claim 15). The Examiner relies on selective choosing of incompatible elements from the references, using Claim 34 as a template. The Examiner selects groove forces from *Rosenberg*, adds different shaped object and device paths from *Gould*, and adds correspondences that are not one-to-one from *Rosenberg II*. However, the groove interaction in *Rosenberg* **requires** that the paths have the same shapes and be in on-to-one correspondence: *Rosenberg* teaches that the grooves are to help the user move the device in the same straight line shown on the screen. The differently shaped paths in *Gould* are taught as an **alternative** to force feedback, not an addition or combination. The non-one-to-one correspondence in *Rosenberg II* is taught to accommodate motion that is **not** based on any object or device paths; if there are paths, they are the same shape since *Rosenberg II's* objective is to connect the visual display of the cursor motion as closely as possible to the user manipulation of the haptic mouse.

The proposed combination accordingly does not produce the invention of Claim 34; even if it did produce the invention of Claim 34, the combination is made possible only with the use of Claim 34 as a guide. The proposed combination would change the basic principle of operation and defeat the underlying purposes of each of the references. Accordingly, the combination is improper and there is no *prima facie* case of obviousness.

I. Rejection of Claim 32 under 35 U.S.C. 103(a) as obvious in view of *Meredith* and *Rosenberg*

Claim 32 depends from Claim 3. As discussed relative to Claim 3, *Rosenberg* does not teach forces from interactions of an object that is moveable in one of *Rosenberg's* grooves. *Meredith* teaches a hardware device that tracks motion of a pool cue and provides that as input to a computer device; *Meredith* has no teaching of force feedback and thus does not supply the interaction force teaching missing from *Rosenberg*. Accordingly, the art does not teach or suggest all the limitations of Claim 32, and there is no *prima facie* case of obviousness.

Meredith teaches hardware to sense the motion of a physical pool cue, taught as desirable to allow a user to have "a real feel of the game of pool." *Meredith* col. 6 lines 60-61. *Meredith* has no teaching or suggestion of the interface affecting the motion of the pool cue; *Meredith* is expressly designed to allow a user to use a real pool cue, and move it with the actual motions used in physical pool games. *Meredith* col. 6 lines 61-65. The proposed combination would replace the real pool cue feel, taught as the purpose of *Meredith's* invention, with computer simulated forces. It would also replace the user's free control of the pool cue with the groove forces of Rosenberg. Accordingly, the proposed combination would change the principle of operation of *Meredith*, and make it unsuitable for its intended purpose. The proposed combination is therefore improper, and there is no *prima facie* case of obviousness.

J. Rejection of Claims 31 and 38 under 35 U.S.C. 103(a) as obvious in view of *Baynton*, *Rosenberg*, and *Meredith*

J. Claim 31, argued separately

Claim 31 depends from Claim 3. As discussed relative to Claim 3, *Rosenberg* does not teach forces from interactions of an object that is moveable in one of *Rosenberg's* grooves. *Meredith* teaches a hardware device that tracks motion of a pool cue and provides that as input to a computer device; *Meredith* has no teaching of force feedback and thus does not supply the interaction force teaching missing from *Rosenberg*. *Baynton* teaches a device for teaching a proper golf swing, and has no teaching of force feedback based on interaction of objects in a computer

application. Accordingly, the art does not teach or suggest all the limitations of Claim 31, and there is no *prima facie* case of obviousness.

Baynton teaches a golf swing training system. *Baynton* is expressly designed to train athletes to produce a correct golf swing in the real world, to train the athletes by constraining the motion of a physical golf club so that the athlete will produce a correct swing in an actual golf game. The Examiner attempts to modify *Baynton* to provide inputs to a golf simulation computer game. However, *Baynton* has no suggestion of golf simulations or computer games; *Baynton* is expressly designed for athletic training, not computer simulation. Further, *Bayton* has no teaching of any sensors or other techniques for deriving input to a computer from the motion of the golf club. *Meredith's* pool cue hardware, accommodating linear motion of a pool cue, would be destroyed by the dramatically different forces and motions in a golf club swing. There is no way to produce the combination required by the rejection: there is no teaching of golf club input to a computer, there is no teaching of interaction of a simulated golf club with other objects, there is no teaching of force feedback to a golf club from simulated interactions. To produce the proposed combination, *Baynton* would have to be redesigned to **sense** motion of the club rather than **control** motion of the club, *Baynton* would have to be used for a completely different purpose (input to a simulation rather than athletic training), and the other missing elements discussed in regard to Claim 3 would have to found. Accordingly, there is no proper combination of the references, and there is no *prima facie* case of obviousness.

J. Claim 38, argued separately

Claim 38 depends from Claim 31, and there is no *prima facie* case of obviousness of Claim 38 for similar reasons as discussed for Claim 31.

Further, Claim 38 recites the additional limitation that the object and device paths are different shapes. The rejection finds no teaching of this in any of the references, but merely asserts that "it is understood that [they] may have different shapes." Office Action page 25. However, *Baynton* **cannot** be modified to have different shaped object and device paths if it is to serve its intended purpose. First, *Baynton* has no object path at all, and there is no teaching of any way to derive an object path from *Baynton's* golf club apparatus. Second, even if there were such a path, *Baynton's* system is designed to teach correct golf swings to athletes. Having **different** shaped paths would destroy *Baynton's* utility as a training device, since the different shaped paths would result in training incorrect swings. Accordingly, there can be no proper combination with *Baynton* that includes differently shaped object and device paths, and there is no *prima facie* case of obviousness.

K. Rejection Claim 37 under 35 U.S.C. 103(a) as obvious in view of *Stewart* and *Rosenberg II*

Claim 37 depends from Claim 35. As discussed in regards to Claim 35, *Stewart* does not teach all the limitations of Claim 35. *Rosenberg II* is cited for its teaching of a safety switch, and does not supply the teachings missing from *Stewart*. Accordingly, the references do not teach all the limitations of Claim 37, and there is no *prima facie* case of obviousness.

Further, Claim 37 recites the additional limitation that the path-based interaction can be enabled and disabled by signals from the user. The rejection asserted that *Rosenberg II's* teaching of a safety switch supplied this teaching, missing from *Stewart*. However, *Rosenberg II's* safety switch turns off all haptic interaction. Claim 37 only controls the path-based motion responsive to a user signal; there is no requirement that haptic interaction be disabled. *Rosenberg II's* switch is thus a "haptic disable" switch, while the signal in Claim 37 is a "path-based motion disable" signal. While the signal in Claim 37 does disable the forces specific to the path-based motion, it is not a haptic disable switch. *Rosenberg II* has no suggestion of any signal that would turn off path-based motion without necessarily also turning off all haptics. Accordingly, the art does not teach or suggest all the limitations of Claim 37, and there is no *prima facie* case of obviousness.

Claims Appendix

We claim:

3. In a human-computer interface, a method of allowing a user of a haptic input device to affect the motion of an object in a computer application, comprising:

a) Establishing an object fundamental path representing a path of motion of the object in the computer application;

b) Establishing a device fundamental path in correspondence with the object fundamental path;

c) Detecting motion of the haptic input device;

d) Moving the object in the computer application along the object fundamental path responsive to a component of haptic input device motion along the device fundamental path; and

e) Applying a force to the haptic input device responsive to a component of haptic input device motion not along the device fundamental path; and

f) Applying a force to the haptic input device responsive to interaction of the object with the application.

4. A method as in Claim 3, further comprising applying forces to the haptic input device corresponding to motion of the object in the application, wherein the forces provide a perception of momentum and inertia of the haptic input device corresponding to momentum and inertia of the object in the application.

5. A method as in Claim 3, wherein the application comprises a plurality of states, and wherein the shape of the object fundamental path is dependent on the state of the application.

6. A method as in Claim 3, wherein the application comprises a plurality of states, and wherein the shape of the device fundamental path is dependent on the state of the application.

7. A method as in Claim 3, wherein the object interacts with the application, and wherein the interaction of the object with the application is dependent on the speed of the object along the object fundamental path.

8. A method as in Claim 3, further displaying a visual representation of the object to the user.

9. A method as in Claim 8, wherein the visual representation when the haptic input device is on the device fundamental path is perceptively different from the visual representation when the haptic input device is not on the device fundamental path.

10. A method as in Claim 3, further comprising:

a) Establishing a second object fundamental path representing a path of motion of a second object in the computer application;

b) Establishing a second device fundamental path in correspondence with the second object fundamental path;

c) Detecting motion of the haptic input device;

d) Determining if either device fundamental path is active, and if so, then

e) Moving the first object if the first device fundamental path is active, or the second object if the second device fundamental path is active, in the computer application along the active object fundamental path responsive to a component of haptic input device motion along the active device fundamental path; and

f) Applying a force to the haptic input device responsive to a component of input device motion not along the active device fundamental path.

11. A method as in Claim 3, wherein the object comprises two representations, a visual representation that is used in a display to provide visual feedback to the user, and an interaction representation that is used with the haptic input device to provide force feedback to the user.

12. A method as in Claim 3, wherein the force has a first magnitude for a first position of the haptic input device a first distance from the device fundamental path, and a second, larger magnitude for a second position of the haptic input device a second, larger distance from the device fundamental path.

13. A method as in Claim 3, further comprising applying a force along the device fundamental path opposing motion of the haptic input device beyond an end of the device fundamental path.

14. In a human-computer interface, a method of allowing a user of a haptic input device to affect the motion of an object in a computer application, comprising:

a) Establishing an object fundamental path representing a path of motion of the object in the computer application;

b) Establishing a device fundamental path in correspondence with the object fundamental path;

c) Detecting motion of the haptic input device;

d) Moving the object in the computer application along the object fundamental path responsive to a component of haptic input device motion along the device fundamental path; and

e) Applying a force to the haptic input device responsive to a component of haptic input device motion not along the device fundamental path; and

f) Applying a force to the haptic input device to urge the haptic input device to a starting region of the range of motion of the haptic input device, where the starting region comprises a region of the range of motion of the haptic input device such that motion of the haptic input device along the device fundamental path starting in the starting region will not require motion of the haptic input device outside its range of motion..

15. A method as in Claim 3, wherein the device fundamental path has a different shape than the object fundamental path.

16. A method as in Claim 15, wherein the device fundamental path defines a curve in three-dimensions.

17. A method as in Claim 16, wherein the device fundamental path defines a curve in two-dimensions.

18. A method as in Claim 15, wherein the device fundamental path defines a surface in three-dimensions.

19. A method as in Claim 3, wherein a characteristic of the object in the application is responsive to motion of the haptic input device off the device fundamental path.

20. A method as in Claim 19, wherein the force resists motion of the haptic input device off the device fundamental path along a first dimension, and wherein a characteristic of the object in the application is responsive to motion of the haptic input device off the device fundamental path along a second dimension different from the first dimension.

21. A method as in Claim 3, wherein the magnitude of the force is partially dependent on the position of the object along the object fundamental path.

22. A method as in Claim 3, wherein the magnitude of the force is partially dependent on interaction of the object with the application.

23. A method as in Claim 3, wherein the magnitude of the force is partially dependent on a user-assistance parameter of the interface.

24. A method as in Claim 23, wherein the user-assistance parameter is established by a measure of the user's proficiency in manipulating the input device.

25. A method as in Claim 14, additionally comprising:

a) Defining a motion-initiation region comprising a portion of the haptic input device range of motion;

b) Determining when the haptic input device is within the motion-initiation region; and

c) When the haptic input device is within the motion-initiation region, applying a force to the haptic input device urging the haptic input device to the device fundamental path.

26. A method as in Claim 3, wherein establishing a device fundamental path comprises:

a) Determining when the user supplies a motion-initiation signal; and then

b) Establishing a device fundamental path according to a defined device path and the position of a cursor controlled by the user when the motion-initiation signal was supplied.

27. A method as in Claim 26, wherein the motion-initiation signal comprises motion of the cursor to a defined range of the cursor's range of motion.

28. A method as in Claim 26, wherein the motion-initiation signal comprises a switch actuated by the user.

29. A method as in Claim 27, wherein the motion-initiation signal further comprises detection of the position of the cursor in a defined range of the cursor's range of motion when the switch is actuated.

30. A method as in Claim 26, wherein the motion-initiation signal comprises motion of the haptic input device having defined characteristics.

31. A method as in Claim 3, wherein:

a) The computer application comprises a golf simulation;

b) The object comprises a golf club; and

c) The object fundamental path comprises a path suited for perception of the swing of a golf club; and

d) Applying a force to the haptic input device responsive to interaction of the object with the application comprises applying a force to the haptic input device responsive to interaction of the object with other objects in the application.

32. A method as in Claim 3, wherein:

a) The computer application comprises a pool simulation;

b) The object comprises a pool cue; and

c) The object fundamental path comprises a path suited for perception of the motion of a pool cue.

34. A method as in Claim 15, wherein the correspondence between the device fundamental path and the object fundamental path is not one to one.

35. In a computer presentation of the interaction of objects simulating physical objects, a method of allowing a user to use a haptic interface device to control the motion of a defined object of such objects, comprising:

a) Establishing an object fundamental path representing a path of motion of the defined object in the computer application;

b) Establishing a device fundamental path in correspondence with the object fundamental path representing a path that can be followed by the haptic interface device;

c) Detecting motion of the haptic interface device;

d) Moving the object in the computer application along the object fundamental path responsive to a component of haptic interface device motion along the device fundamental path; and

e) Applying a force to the haptic interface device responsive to a component of input device motion not along the device fundamental path.

36. A method as in Claim 35, further comprising applying a force to the haptic interface device responsive to interaction of the object with another object in the computer presentation.

37. A method as in Claim 35, further comprising:

f) accepting a signal from the user indicating that a path interaction is desired, and, when said signal is accepted, then moving the object according to d) and e);

g) accepting a signal from the user indicating that a path interaction is not desired, and, when said signal is accepted, then moving a cursor in the computer presentation corresponding to motion of the haptic interface device.

38. A method as in Claim 31, wherein the object fundamental path and the device fundamental path have different shapes.

Evidence appendix.

none

Related proceedings appendix.

none